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IN THE CLAIMS:

Please substitute the following claims for the previous claims.

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1. (currently amended) A substrate processing apparatus comprising:

- a process chamber capable of processing a substrate, the substrate having overlying and underlying materials;
- a radiation source capable of providing non-polarized radiation that is at least partially reflected from the substrate in the chamber;
- a radiation detector adapted to detect the reflected radiation and generate a signal; and
- a controller adapted to
 - (i) receive the signal,
 - (ii) calculate a dynamic variance within a predefined time period of the signal by subtracting an intensity value at a minimum point from an intensity value at a maximum point, and
 - (iii) determine a property of the overlying or underlying material on the substrate in the chamber ~~from a~~ based on the calculated dynamic variance of amplitude of the signal.

2-6. (cancelled)

7. (original) An apparatus according to claim 1 wherein the controller is further adapted to detect both an onset and completion of processing of a plurality of materials on the substrate.

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8. (currently amended) A method of processing a substrate in a process zone, the method comprising the steps of:

(a) placing the substrate in the process zone, the substrate having overlying and underlying materials;

(b) detecting non-polarized radiation reflected from the substrate before, during, or after processing of the substrate; and

(c) calculating a dynamic variance within a predefined time period of the signal by subtracting an intensity value at a minimum point from an intensity value at a maximum point; and

(d) evaluating the detected radiation to determine determining a property of the overlying or underlying material on the substrate in the process zone from a the dynamic variance ~~of amplitude~~ of the signal.

9. (previously amended) A method according to claim 8 comprising determining the thickness of the underlying material on the substrate from the dynamic variance of the reflected radiation.

10-12. (cancelled)

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13. (currently amended) A substrate processing apparatus comprising:

(a) a chamber capable of processing a substrate, the substrate having overlying and underlying materials;

(b) a radiation source capable of providing non-polarized radiation that is at least partially reflected from the substrate in the chamber;

(c) a radiation detector adapted to detect the reflected radiation and generate a signal; and

(d) a computer having a memory capable of operating a computer-readable program embodied on a computer-readable medium, the computer readable program including program code to

(i) receive the signal,

(ii) calculate a dynamic variance within a predefined time period of the signal by subtracting an intensity value at a minimum point from an intensity value at a maximum point, and

(iii) determine a property of the overlying or underlying material on the substrate in the chamber from a the dynamic variance of amplitude of the signal.

14. (previously amended) An apparatus according to claim 13 wherein the program code is adapted to determine (i) a thickness of the underlying material or (ii) a dopant level of the overlying material from the dynamic variance of the reflected radiation.

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15. (currently amended) A substrate processing apparatus comprising:

- (a) a process chamber capable of processing a substrate, the substrate having overlying and underlying materials;
- (b) a radiation source capable of providing radiation that is at least partially reflected from the substrate during processing;
- (c) a radiation detector adapted to detect the reflected radiation and generate a signal; and
- (d) a controller adapted to
 - (i) receive the signal,
 - (ii) calculate a dynamic variance within a predefined time period of the signal by subtracting an intensity value at a minimum point from an intensity value at a maximum point, and
 - (iii) ~~determine both an onset and a completion of processing of the overlying material on a thickness of the underlying material of the substrate from a predetermined~~ the dynamic variance of amplitude of the signal.

16. (previously amended) An apparatus according to claim 15 wherein the overlying and underlying materials are processed on the substrate, and wherein the controller is adapted to detect the onset and completion of processing of both materials.


17. (cancelled)

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18. (currently amended) A method of processing a substrate in a process zone, the method comprising the steps of:

- (a) placing the substrate in the process zone, the substrate having overlying and underlying materials;
- (b) setting process conditions in the process zone to process the substrate;
- (c) detecting radiation reflected from the substrate during processing and generating a signal;
- (d) determining an onset of processing of the overlying material on the substrate;
- (e) calculate a dynamic variance within a predefined time period of the signal by subtracting an intensity value at a minimum point from an intensity value at a maximum point; and

 (f) ~~determining a completion of processing of the overlying material~~ determining a thickness of the underlying material of the substrate from a ~~predetermined~~ the dynamic variance ~~of amplitude~~ of the signal.

19. (cancelled)

20. (previously amended) A method according to claim 19 wherein the change in amplitude results from changes in reflectivity or thickness of the material.

21. (previously amended) A method according to claim 19 wherein the change in amplitude is characterized by a constructive or destructive interference of radiation reflected from the substrate surface and radiation transmitted through a thickness of the overlying material and reflected from one or more underlying interfaces

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22. (currently amended) A substrate processing apparatus comprising:

(a) a chamber capable of processing a substrate, the substrate having overlying and underlying materials;

(b) a radiation source capable of providing radiation that is at least partially reflected from the substrate during processing;

(c) a radiation detector adapted to detect the reflected radiation and generate a signal; and

(d) a computer having a memory capable of operating computer-readable program embodied on a computer-readable medium, the computer readable program including program code to

(i) receive the signal,

(ii) calculate a dynamic variance within a predefined time period of the signal by subtracting an intensity value at a minimum point from an intensity value at a maximum point, and

(iii) detect an onset and completion of processing of the overlying material on determine a thickness of the underlying material of the substrate from a predetermined the dynamic variance of amplitude of the signal by comparing the dynamic variance to predetermined values of dynamic variance stored in the memory of the computer.

23. (original) A substrate processing apparatus comprising:

a process chamber capable of processing a substrate in a plasma;
one or more radiation detectors to detect a radiation emission from the plasma and generate a first signal, and to detect a radiation reflected from the substrate and generate a second signal; and

a controller adapted to receive the first and second signals.

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24. (original) An apparatus according to claim 23 wherein the controller is adapted to evaluate the first and second signals to determine an event in the chamber or a property of a material on the substrate.

25. (original) An apparatus according to claim 23 wherein the controller is adapted to evaluate the first and second signals to determine an onset of processing of a material on the substrate.

26. (original) An apparatus according to claim 25 wherein the controller is adapted to evaluate the first and second signals to determine an onset of processing of an underlayer while an overlayer is being processed.

27. (original) An apparatus according to claim 23 wherein the controller is adapted to combine the first and second signals.

28. (original) An apparatus according to claim 23 wherein the controller is adapted to evaluate a derivative of the first and second signals.

29. (cancelled)

30. (original) An apparatus according to claim 23 wherein the controller is adapted to detect both an onset and completion of processing of a material on the substrate.

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31. (original) A method of processing a substrate in a process zone, the method comprising the steps of:

- (a) placing the substrate in the process zone;
- (b) setting process conditions in the process zone to form a plasma to process the substrate;
- (c) detecting a radiation emission from the plasma and generating a first signal;
- (d) detecting a radiation reflected from the substrate and generating a second signal; and
- (e) evaluating the first and second signals to determine the occurrence of an event in the process zone or a property of a material on the substrate.

32. (original) A method according to claim 31 comprising evaluating the first and second signals to determine an onset of processing of a material on the substrate.

33. (original) A method according to claim 31 comprising evaluating the first and second signals to determine an onset of processing of an underlayer while an overlayer is being processed.

34. (original) A method according to claim 31 comprising combining the first and second signals.

35. (original) A method according to claim 31 comprising determining a derivative of the first and second signals.

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36. (original) A substrate processing apparatus comprising:

- (a) a chamber capable of processing a substrate in a plasma;
- (b) one or more radiation detectors to detect radiation emitted from the plasma and generate a first signal, and to detect radiation reflected from the substrate and generate a second signal; and
- (c) a computer having a memory capable of operating a computer-readable program embodied on a computer-readable medium, the computer readable program including program code to receive the first and second signals and determine an event in the chamber or a property of a material on the substrate.

37. (original) An apparatus according to claim 36 wherein the program code determines a property of the material from a change in amplitude of the radiation.

38-77. (cancelled)

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78. (currently amended) A substrate processing apparatus comprising:

- a chamber capable of processing a substrate, the substrate having overlying and underlying materials;
- a radiation source capable of providing radiation that is at least partially reflected from a substrate in the chamber;
- a radiation detector adapted to detect the reflected radiation and generate a signal; and
- a controller adapted to
 - (i) receive the signal,
 - (ii) calculate a dynamic variance within a predefined time period of the signal by subtracting an intensity value at a minimum point from an intensity value at a maximum point, and
 - (iii) evaluate ~~a the~~ dynamic variance ~~of amplitude~~ of the signal in relation to a calculated or stored range of dynamic variances ~~of amplitude~~ of the signal for a ~~batch~~ plurality of substrates to determine a property of the overlying or underlying material of the substrate.

79. (previously amended) An apparatus according to claim 78 wherein the controller is adapted to evaluate the dynamic variance to determine if the dynamic variance is within the calculated or stored range.

80. (previously amended) An apparatus according to claim 78 wherein the controller is further adapted to provide an instruction signal to remove the substrate from the chamber, end processing, or adjust process conditions, in response to the evaluation of the dynamic variance.

81. (previously amended) An apparatus according to claim 78 wherein the controller is adapted to provide an instruction signal at the beginning of processing of the substrate.

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82. (previously amended) An apparatus according to claim 78 wherein the controller is adapted to evaluate a change in the dynamic variance of the amplitude.

83. (currently amended) A method of processing a substrate in a process zone, the method comprising the steps of:

(a) placing the substrate in the process zone, the substrate having overlying and underlying materials;

(b) detecting radiation reflected from the substrate before, during, or after processing of the substrate and generating a signal;

(c) calculating a dynamic variance within a predefined time period of the signal by subtracting an intensity value at a minimum point from an intensity value at a maximum point; and

(d) evaluating a the dynamic variance of amplitude of the signal relative to a calculated or stored range of dynamic variances of amplitude of the signal for a ~~batch~~ plurality of substrates to determine a property of the overlying or underlying material of the substrate.

84. (previously amended) A method according to claim 83 wherein the step (c) comprises determining if the dynamic variance is within the calculated or stored range.

85. (original) A method according to claim 83 further comprising the step of providing an instruction signal to remove the substrate from the chamber, end processing, or adjust process conditions, in relation to the evaluation step.

86. (previously amended) A method according to claim 85 comprising providing the instruction signal to adjust process conditions at the beginning of processing of the substrate.

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87. (previously amended) A method according to claim 83 comprising evaluating a change in the dynamic variance of the amplitude.

88. (previously amended) A substrate processing apparatus comprising:

- (a) a chamber capable of processing a substrate, the substrate having overlying and underlying materials;
- (b) a radiation source capable of providing radiation that is at least partially reflected from the substrate during processing;
- (c) a radiation detector adapted to detect the reflected radiation and generate a signal; and
- (d) a computer having a memory capable of operating a computer-readable program embodied on a computer-readable medium, the computer readable program including program code to
- (i) receive the signal,
 - (ii) calculate a dynamic variance within a predetined time period of the signal by subtracting an intensity value at a minimum point from an intensity value at a maximum point, and
 - (iii) evaluate a the dynamic variance of amplitude of the signal in relation to a range of dynamic variances of amplitude of the signal for a batch plurality of substrates to determine a property of the overlying or underlying material of the substrate.

89. (previously amended) An apparatus according to claim 88 wherein the program code is adapted to evaluate the dynamic variance to determine if the dynamic variance is within the range.

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90. (previously amended) An apparatus according to claim 88 wherein the program code is further adapted to provide an instruction signal to remove the substrate from the chamber, end processing, or adjust process conditions, in response to the evaluation of the dynamic variance.

91-101. (cancelled)

102. (currently amended) A substrate processing apparatus comprising:

a chamber capable of processing a substrate, the substrate having overlying and underlying materials;

a radiation source capable of providing radiation that is at least partially reflected from the substrate in the chamber;

a radiation detector adapted to detect the reflected radiation and generate a signal having a dynamic variance of amplitude;

a controller adapted to

(i) receive the signal,

(ii) calculate a dynamic variance within a predefined time period of the signal by subtracting an intensity value at a minimum point from an intensity value at a maximum point, and

(iii) generate a set of data from the dynamic variance of amplitude relating to a property of the overlying or underlying material of the substrate; and

a factory automation host computer to receive and evaluate the data, and control the processing of the substrate in relation to the data.

103. (original) An apparatus according to claim 102 wherein the factory automation host computer comprises a software program for substrate evaluation, process evaluation or process control.

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104. (previously amended) An apparatus according to claim 103 wherein the software program is adapted to evaluate the data to determine statistical process control parameters.

105. (original) An apparatus according to claim 102 wherein the factory automation host computer is adapted to provide an instruction signal to remove the substrate from the chamber, end processing, or adjust process conditions, upon a determination of an unsuitable property of the substrate or an unsuitable process parameter.

106. (previously amended) An apparatus according to claim 105 wherein the factory automation host computer is adapted to provide the instruction signal to adjust process conditions at the beginning or end of processing of the substrate.

107. (previously amended) A substrate processing apparatus comprising:

a process chamber capable of processing a substrate, the substrate having overlying and underlying materials;

a radiation source capable of providing non-polarized radiation that is at least partially reflected from the substrate in the chamber;

a radiation detector adapted to detect the reflected radiation and generate a signal; and

a controller adapted to receive the signal and determine a property of the overlying or underlying material of the substrate in the chamber by determining whether the signal meets a sequence of preprogrammed slope criteria.

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108. (previously amended) A method of processing a substrate in a process zone, the method comprising the steps of:
- (a) placing the substrate in the process zone, the substrate having overlying and underlying materials;
 - (b) detecting radiation reflected from the substrate before, during, or after processing of the substrate; and
 - (c) evaluating the detected radiation to determine a property of the overlying or underlying material of the substrate in the process zone by determining whether the signal meets a sequence of preprogrammed slope criteria.
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